

### DETAILED ACTION

The last final office action dated 03/21/2008 has been withdrawn, and a new non-final office action has been issued as following.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 9 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hammond et al., Patent No. 6,553,961, in view of Kuehn, III, Patent No. 3,884,207, and further in view of Newton et al., Patent No. 6,631,067.

With respect to claim 9, Kuehn discloses a system [Fig. 1], comprising a dual-coil half bridge [Fig. 1; consists of coils 36 and 38; col. 3, lines 30-32] converter adapted to be coupled to a single or multiple coil actuator of a valve, the cylinder valve in an internal combustion engine [col. 2 lines 42-46], the converter having a first [Fig. 1,46] and second [Fig. 1,48] capacitor and a voltage source [Fig. 1,46, col. 4, lines 1-4], with at least one end of each of the first and second capacitors coupled to a common reference [Fig. 1, first ends of the coils 36 and 38 are connected to the common reference node 44], the converter actuated via switches [Fig. 1, switches 26 and 30] to individually energize coils in said dual coil actuator, wherein at least one end of said actuator is coupled to said common reference, and wherein said dual-coil half bridge converter maintains a charge balance on said first and second capacitors [Fig. 1;

capacitors 46 and 48 maintain a balance of charge between them depending on which of switches 26 or 30 is closed or open, by passing charge back and forth during the appropriate alternation of flywheel 12 (col. 6 line 35-40)]. However, Kuehn does not disclose the actuator being energized to control actuation of the intake or exhaust valve between an open position and a closed position; and that the converter is adapted to be coupled to a plurality of engine cylinder valves and the charge balance is maintained by disabling at least some of the plurality of cylinders in natural charge sharing pairs.

Hammond discloses an electronic control circuit, which comprises a dual-coil converter coupled to an intake or exhaust valve of a cylinder in an internal combustion engine, the actuator being energized to control actuation of the intake or exhaust valve between an open position and a closed position [abstract, lines 1-10]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Kuehn's capacitors, into Hammond's electronic control circuit, for the benefit of maintaining a balance of charge by draining off switching arcing energy.

Newton discloses a system comprising a converter [Fig. 5-13] adapted to be coupled to a plurality of single or multiple coil actuators [20], the converter having a first and a second capacitors and a voltage source [Fig. 5-7, 9, 10-12], wherein said bi-directional converter maintains a charge balance on said first and second capacitors, wherein said converter is adapted to be coupled to a plurality of engine cylinder valves and the charge balance is maintained by disabling at least some of the plurality of cylinders in natural charge sharing pairs [col. 5 lines 5 – col. 6 lines 11].

All three teachings are analogous internal combustion engines. It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Newton's method of charging capacitors, into Hammond as modified by Kuehn, for the benefit of maintaining a balance charge by draining off switching arcing energy.

With respect to claim 12, Newton discloses that the dual coil half bridge converter maintains a charge balance on said first and second capacitor [Fig. 5-7; two capacitors shown] even when at least one cylinder of the engine is deactivated while at least one other cylinder carries out combustion [Fig. 5-7; capacitors maintain a balance of charge between them depending on which of switches Q1 and Q2 is closed or open, by passing charge back and forth; col. 5 lines 5 – col. 6 lines 11].

With respect to claim 13, Kuehn discloses that the capacitors form a dual voltage source [col. 4 lines 1-9].

With respect to claim 14, Kuehn discloses that the dual coil half bridge converter is adapted to be coupled to at least two dual coil actuators [Fig. 1 ; consists of two coils 36 and 38] of two cylinder valves [Fig. 1, cylinders A and B], wherein the converter is configured to balance voltage of said first and second capacitor [col. 4 lines 10 - 53].

***Allowable Subject Matter***

Claims 20-24 and 26 is allowed. The following is an examiner's statement of reasons for indicating allowance of claim 20: The prior art does not disclose that the system further comprises third and fourth coils, wherein said system is configured to balance voltage across said first, second, third, and fourth coils. This feature in

combination with the rest of the claim limitations is not anticipated or rendered obvious by the prior art of record.

### ***Response to Arguments***

Applicant's arguments with respect to claim 9 have been considered but are moot in view of the new ground(s) of rejection.

The examiner points out that a new reference by Newton [Patent No. 6,631,067] has been introduced to meet the limitation of (claim 9) maintaining a charge balance on the first and second capacitors, the charge balance is maintained by disabling at least some of the plurality of cylinders in natural charge sharing pins.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DHARTI H. PATEL whose telephone number is (571)272-8659. The examiner can normally be reached on 7:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on 571-272-2800, Ext. 36. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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